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Optical Material," by Victor M. Ilyashenko, filed June 12, 1997, now U.S. Patent No. 6,086,999 issued July 11, 2000.

Remarks

This is in response to the Office Action mailed June 27, 2002 (Paper No. 12).

The above amendment to the specification comprises merely a clarification of and additional information related to Applicants priority claim. No new matter has been added.

Applicants begin by noting that their Information Disclosure Statement mailed November 8, 2001 was not indicated in the Office Action as having been received or considered by the Examiner. Applicants, however, received a return receipt postcard confirming receipt of this Information Disclosure Statement, which was date stamped January 28, 2002 by the Patent Office. Applicants request that the Examiner, in the next Office communication or, preferably, by telephone communication with the undersigned, indicate whether or not he is in possession of the above-mentioned Information Disclosure Statement, and, if so, that the Examiner initial the corresponding form PTO-1449 indicating that the reference cited therein was considered. If the above-mentioned Information Disclosure Statement was not received by the Examiner, Applicants will gladly resend a copy of the Information Disclosure Statement and the cited reference to the Examiner's for his consideration.

Applicants also note that in Paragraph 1 of the Office Action, in which the Patent Office's Election/Restriction requirement is maintained, comments are made suggesting that claim 1 of the present application, which has been withdrawn from consideration, is anticipated by U.S. Patent No. 3,718,383. No reasoning or support is given in the Office Action for the conclusory statement that claim 1 is anticipated by this reference. Since claim 1 has been withdrawn from consideration, and since the Office Action provides insufficient detail regarding the basis of the rejection to allow for a meaningful response at this time, Applicants do not herein address the issue of anticipation of claim 1 in detail. However, Applicants believe that claim 1 is not anticipated by U.S. Patent No. 3,718,383

and reserve the right to traverse any rejection of claim 1 as being anticipated by this reference if properly raised in a future Office Action in the present application or in any subsequently filed applications claiming priority to the present application under 35 U.S.C. §120.

Rejection of claim 71 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,763,514 to Koike (hereinafter Koike '514)

Reconsideration is respectfully requested of the rejection of claim 71 under 35 U.S.C. §103(a) as being unpatentable over Koike '514 in view of the remarks below.

The Office Action states that Koike '514 discloses the method recited in claim 71 except that the reference fails to explicitly teach the recited draw rate of at least 3 m/min. It is then stated that one of ordinary skill in the art would be motivated to employ as fast a draw rate as possible to minimize production time and cost, and that the recitation of a minimum value for a parameter which the skilled individual knows should be minimized and which could be obtained through only routine experimentation is obvious.

Applicants respectfully disagree that the above reasoning renders claim 71 obvious. Applicants agree that the recitation of a minimum value for a parameter which the skilled individual knows should be minimized and which, furthermore, could be attained through only routine experimentation could comprise an obvious modification. Such is not the case for the recited draw rate of claim 71, however. Specifically, Applicants believe that the ability to hot-draw a polymeric preform rod at a draw rate of at least 3 m/min to obtain a fiber that conducts light of at least one wavelength with an attenuation less than 500 dB/km, as recited in claim 71, could not have been attained by an artisan of ordinary skill at the time Applicants' invention was made through modification of the teachings of Koike '514 utilizing only routine experimentation or optimization.

Indeed, Applicants believe that it is only through the teaching of their own specification that one of ordinary skill in the art at the time Applicants' invention was made would have been enabled to hot-draw a polymeric preform rod at a rate of at least 3

m/min into an optical fiber able to conduct light with an attenuation less than that recited in claim 71, without making an inventive step. Such teaching in Applicants' specification enabling the claimed draw rate and attenuation includes, in some embodiments, the inventive inclusion of a plasticizer and/or plasticizing dopant in the sheathing portion of the preform rod, as is disclosed in Applicants' specification on, for example, pages 9, 11, 14, and 19-21. As explained in Applicants' specification, Applicants' inventive techniques can enable formation of optical fibers having acceptably low levels of attenuation at hot-draw rates of the magnitudes recited in claim 71, which was not believed to be attainable utilizing prior art methods.

Koike '514, despite providing an extensive specification and a large number of working examples, does not disclose or suggest that any of the preforms obtained by his methods would be able to be formed into a fiber by hot-drawing the preform at draw rates as recited in claim 71 to obtain a fiber having an attenuation level as recited in claim 71. Neither does Koike '514 disclose or suggest the use of a plasticizer or plasticizing dopant in the sheathing portion of his optical articles. In fact, as discussed above, nothing disclosed or suggested in Koike '514 is believed to be sufficient to have enabled the artisan of ordinary skill to have utilized the hot-drawing rates as recited in claim 71 to form a fiber with an attenuation as recited in claim 71 without the benefit of Applicants' own disclosure for guidance. Accordingly, Koike '514 cannot render obvious or otherwise unpatentable Applicants' claim 71. Therefore, reconsideration and withdrawal of the rejection of claim 71 on the present grounds is respectfully requested.

Rejection of claims 31-44 under 35 U.S.C. §103(a) as being unpatentable over Koike '514 in view of U.S. Patent No. 5,593,621 to Koike et al. (hereinafter Koike '621)

Reconsideration is respectfully requested of the rejection of claims 31-44 under 35 U.S.C. §103(a) as being unpatentable over Koike '514 in view of Koike '621 in view of the remarks below.

The Office Action states that Koike '514 discloses the method for forming a gradient index plastic optical article as recited in independent claim 31, except that Koike

'514 does not teach that the sheathing monomer utilized for forming the tube of polymeric sheathing material includes a sheathing dopant therein. The Office Action further states that Koike '621, which discloses a co-extrusion method for forming plastic optical fibers, teaches the addition of a dopant to the melt polymer forming an outer extruded portion of the fiber (stated as being equivalent to Applicants' recited sheathing) and further provides a rationale for including a dopant in the sheathing, which is recited at column 7, lines 42-45 - namely, to facilitate the formation of an optical fiber having a variety of desirable refractive index distributions. The Office Action then states that one of ordinary skill in the art, desiring to make a certain desired refractive index profile, would have been motivated to modify the method of Koike '514 by including dopant in the sheathing, as is supposedly suggested by Koike '621, for the reasons disclosed therein.

Applicants respectfully disagree. As explained in greater detail below, because the co-extrusion method for forming an optical fiber disclosed in Koike '621 is fundamentally different from the polymerization method taught in Koike '514 in a way that would have resulted in the free diffusion of dopant, disclosed in Koike '621 to be important for forming a variety of desired refractive index profiles, not having been expected to be applicable to the method described in Koike '514, there would have been no motivation to modify the method of Koike '514 along the lines suggested in the Office Action, and there would have been no reasonable expectation of success in achieving the desirable results discussed in Koike '621, and highlighted by the Office Action as providing a motivation for combination.

In contrast to the methods disclosed in Koike '514, in which an optical article is formed by polymerizing a core-forming monomer within a solid, pre-polymerized, sheathing, the methods of Koike '621 form optical fibers via simultaneous, concentric co-extrusion of pre-polymerized material in a melt state. This fundamental difference in the basic technique of formation between the two references, would, as explained in more detail below, have suggested to the artisan of ordinary skill at the time Applicants' invention was made that the rationale and reasons for including a dopant within the

peripheral regions of the melt polymer forming the fibers made by the Koike '621 methods were not applicable or transferable to the methods described in Koike '514. The motivation identified in Koike '621 by the Office Action for adding a dopant to a sheathing of the articles as formed by the methods disclosed in Koike '514, namely, the ability to form a variety of desired refractive index profiles throughout the cross section of the resulting optical fiber, would not have been expected to be applicable or operable in the methods disclosed in Koike '514.

The reason why this is so is because formation of the refractive index gradient in Koike '621 is disclosed as relying on the ability of the dopant to freely diffuse in the co-extruded melt polymer so as to form the variety of desired refractive index gradients (see e.g., Koike '621 at column 13, lines 46-55). It is no coincidence that Koike '621 refers to his dopant as the "diffusible material." Indeed, the various conditions for forming the extruded optical articles in Koike '621 are selected to facilitate and control the extent of this diffusion within the melt polymer during formation (see e.g., column 12, lines 38-44 and especially column 6, lines 52-60, describing this in the context of the embodiment specifically highlighted the Office Action in which a low index dopant is added to a peripheral zone of the melt polymer, which is extruded around a higher index melt polymer). As disclosed in the above-referenced sections, the ability to form optical articles having a variety of desired refractive index profiles depends upon the ability of the diffusible substance (i.e., dopant) to freely diffuse throughout the polymer from the periphery toward the central portion of the polymer, or vice versa, while it is in a melt state. Moreover, Koike '621 teaches that it is during the period when the polymer is in the melt state (i.e., before solidification) that the free diffusion of dopant important to establishing the variety of desired refractive index profiles of the final optical articles is able to occur (see e.g., column 6, lines 30-38).

By contrast, in the methods disclosed in Koike '514, the sheathing tube in which the core is polymerized is already solidified when the core is formed and is maintained in a solid (i.e., non-melt) form during formation of the core (as it must be to contain the core monomer during polymerization). Free diffusion of sheathing dopant in both the

peripheral (i.e. sheathing tube) and central regions (i.e. core) of the optical article during formation, as disclosed in Koike '621 as being facilitated by the melt state of both the core and peripheral polymers during co-extrusion, would not have been expected to occur in a similar fashion during formation of the optical articles by the methods of Koike '514, given the use therein of a solid sheathing tube during the formation of the core.

Accordingly, those of ordinary skill in the art looking to Koike '621 would not have expected that provision of the dopant in the solid sheathing tubes used for forming the optical articles produced by the Koike '514 methods would result in formation of the desirable variety of refractive index gradient distributions disclosed in Koike '621. Rather, given the Koike '621 teaching that the dopant should be freely diffusable in a melt polymer during formation of the gradient in the optical article, and that solidification should occur only after diffusion of the dopant to form the desired refractive index profile (see e.g., column 6, lines 30-37), the skilled artisan would have not have reasonably expected that any sheathing dopant present in the solidified sheathing tubes of Koike '514 during optical article formation would similarly have been able to result in formation of the variety of desired refractive index gradients disclosed in Koike '621. Therefore, it is believed that there would have been no motivation for combining the teachings of Koike '621 and Koike '514 along the lines suggested in the Office Action and no reasonable expectation of success in forming a variety of desired refractive index profiles as disclosed in Koike '621 (the supposed motivation to combine) by attempting such combination.

In addition, it is also believed that neither of the cited references provide any credible reason to those of ordinary skill in the art wishing to practice the basic method recited in Koike '514 to look to Koike '621 to improve or optimize the refractive index profiles obtainable by practicing the Koike '514 method as disclosed. There is no disclosure or suggestion in Koike '514 that suggests that the disclosed method has any deficiency for forming a wide range of desirable refractive index profiles. Moreover, Koike '514 teaches that its methods are capable of producing desirable and optimal or near optimal refractive index profiles (see e.g., column 13, lines 1-16; column 17, lines

29-32; column 18, lines 31-34; column 19, lines 21-24; column 20, lines 21-24; column 21, lines 27-30; column 22, lines 34-37; column 23, lines 35-38; and column 24, lines 35-38). Neither reference is believed to provide any motivation to the skilled artisan, wishing to produce plastic optical articles having desirable refractive index profiles according to the basic polymerization method recited in Koike '514, to look beyond the disclosure of Koike '514. Indeed, the Patent Office maintains that the addition of a sheathing dopant to the sheathing produced according to Koike '514 is an obvious modification in view of Koike '621; however, Koike himself, presumably someone having a skill level at least as great as the ordinarily skilled artisan, does not appear to have made the suggested combination, as evidenced by the fact that there is no disclosure or suggestion of use of a sheathing dopant in his '514 patent application, which was first filed in the United States on June 17, 1993, nearly contemporaneously with the '621 application on which he is a co-inventor, which was PCT filed on August 16, 1993.

In view of the above remarks, it is believed that the rejection of independent claim 31 as unpatentable over Koike '514 in view of Koike '621 has been overcome, and reconsideration and withdrawal of the rejection of this claim on the present grounds is respectfully requested. Claims 32-44 each depend from and include all of the limitations of independent claim 31 and are believed to patentably distinguish the combination of Koike '514 and Koike '621 for at least the reasons described above with respect to independent claim 31. Therefore, reconsideration of the rejection of these claims on the present grounds and withdrawal of the rejection is also respectfully requested.

Rejection of claims 1-44 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 14 of U.S. Patent No. 6,086,999

As an initial note, Applicants believe that the rejection of claims 1-30 on the present grounds at the present time is improper, since the Office Action indicates that these claims have been withdrawn from consideration. Accordingly, since these claims are not currently under examination, Applicants respectfully request that the Examiner withdraw the rejection with respect to these claims.

Reconsideration is requested of the rejection of claims 31-44 under the judicially created doctrine of obviousness-type double patenting, as being unpatentable over claim 14 of U.S. Patent No. 6,086,999, in view of a terminal disclaimer accompanying this response. On the basis of the terminal disclaimer it is believed that the rejection on this ground has been obviated, and it is respectfully requested that the rejection be withdrawn.

Conclusion

A favorable office action is hereby respectfully requested. If, for any reason, the Examiner is of the opinion that a telephone conversation with Applicants' representative would expedite prosecution, the Examiner is requested to contact the undersigned at (617) 720-3500.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,



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Marked-Up Specification

Please rewrite the paragraph beginning at line 3 on page 1 (after the title) as follows.

This application is a national stage [application, claiming priority to] filing under 35 U.S.C. §371 of International Application No. PCT/US98/12295 filed 12 June 1998, which was published under PCT Article 21(2) in English. This International Application claims priority to U.S. Serial No. 08/873,952, entitled "Method for Producing a Graded Index Plastic Optical Material," by Victor M. Ilyashenko, filed June 12, 1997, now U.S. Patent No. 6,086,999 issued July 11, 2000.